

**THE OFFICE OF REGULATORY STAFF**  
**DIRECT TESTIMONY**  
**OF**  
**NORMAN K. RICHARDSON, JR.**  
**SEPTEMBER 24, 2018**



**DOCKET NO. 2017-370-E**

**Joint Application and Petition of South Carolina Electric & Gas Company and Dominion Energy, Incorporated for Review and Approval of a Proposed Business Combination between SCANA Corporation and Dominion Energy, Incorporated, as May be Required, and for a Prudency Determination Regarding the Abandonment of the V.C. Summer Units 2 and 3 Project and Associated Customer Benefits and Cost Recovery Plans**

**DIRECT TESTIMONY**

**OF**

**NORMAN K. RICHARDSON, JR.**

**ON BEHALF OF**

**THE SOUTH CAROLINA OFFICE OF REGULATORY STAFF**

**DOCKET NO. 2017-370-E**

**IN RE: JOINT APPLICATION AND PETITION OF SOUTH CAROLINA  
ELECTRIC & GAS COMPANY AND DOMINION ENERGY,  
INCORPORATED FOR REVIEW AND APPROVAL OF A PROPOSED  
BUSINESS COMBINATION BETWEEN SCANA CORPORATION AND  
DOMINION ENERGY, INCORPORATED, AS MAY BE REQUIRED, AND  
FOR A PRUDENCY DETERMINATION REGARDING THE  
ABANDONMENT OF THE V.C. SUMMER UNITS 2 & 3 PROJECT  
AND ASSOCIATED CUSTOMER BENEFITS AND COST RECOVERY  
PLANS**

**Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND OCCUPATION.**

**A.** My name is Norman K. Richardson, Jr. My business address is 32 Dunaire Court,  
Mableton, Georgia 30126. I am President of Anchor Power Solutions, LLC.

**Q. PLEASE STATE YOUR EDUCATIONAL BACKGROUND AND EXPERIENCE.**

**A.** I received a Bachelor of Science degree in Mathematics from Furman University  
in Greenville, South Carolina, and a Master of Science degree in Electrical Engineering  
from the Georgia Institute of Technology in Atlanta, Georgia. For nineteen years, I worked  
for Energy Management Associates and its successor companies (EDS Utilities Division,  
NewEnergy Associates and Ventyx), in Atlanta, Georgia. In this capacity, I developed  
software models and provided consulting services for market price forecasting, integrated

resource planning, and asset valuation. In 2014, I founded a new company, Anchor Power Solutions, that provides similar software and consulting services.

My previous consulting experience includes providing testimony to the Wisconsin Public Service Commission in support of market price forecasts used for evaluating the sale of the Point Beach Nuclear Power Station. I have also testified before the Michigan Tax Tribunal regarding market price forecasts used to develop valuations for power plants throughout Michigan. I have also analyzed test year production costs for Hawaii electric rate case filings and performed economic evaluations of proposed new nuclear and renewable projects throughout the United States.

**Q. HAVE YOU TESTIFIED PREVIOUSLY BEFORE THE PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA?**

**A.** No.

**Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

**A.** The purpose of my testimony is to present the results of an analysis comparing the costs, as of March 31, 2015, of either completing construction of the V.C. Summer Units 2 and 3 Project ("NND Project") 1) on a schedule with completion dates of June 2021 for Unit 2 and June 2022 for Unit 3, or 2) abandoning the NND Project and constructing two combined cycle gas plants of the same size with the same online dates instead. I will also address deficiencies in the economic analysis presented by South Carolina Electric & Gas ("SCE&G") in Docket 2016-223-E ("Lynch 2016 Study") and in this docket ("Lynch 2017 Studies").

**Q. WHAT IS THE BASIS OF THIS ANALYSIS?**

A. This analysis is based on the study “Comparative Economic Analysis of Completing Nuclear Construction or Pursuing a Natural Gas Resource Strategy”, which was offered by SCE&G witness Joseph M. Lynch as Exhibit JML-1 in the corrected version of his direct testimony for Docket No. 2015-103-E. This study (“Lynch 2015 Study”) concluded that the NND Project “remains the strategy best able to provide favorable results over a broad range of future operating conditions. The most reasonable estimate of the cost advantage of completing the [NND Project] is \$278 million per year for 40 years.” All nine scenarios using the base load forecast in the Lynch 2015 Study showed an economic advantage over 40 years for completing the NND Project (values are in millions of dollars):

	Base Gas	50% Higher Gas	100% Higher Gas
\$0 CO2 Price	\$28	\$144	\$248
\$15 CO2 Price	\$97	\$210	\$326
\$30 CO2 Price	\$166	<b>\$278</b>	\$392

The supporting spreadsheets for the Lynch 2015 Study were obtained through ORS Audit Information Request 5-26.

**Q. WHAT CORRECTIONS DID YOU MAKE TO THE LYNCH 2015 STUDY?**

A. 1) The Return on Equity (“ROE”) for the NND Project assumed 10.25% (consistent with the combined cycle alternative), but the calculation for income tax and Base Load Review Act (“BLRA”) recovery was based on a higher ROE of 11%. This was corrected in the Lynch 2016 Study and the Lynch 2017 Studies. Correcting the tax and BLRA recovery increases the NND Project benefit by \$19.8 million per year for 40 years, or \$21.4 million per year for 20 years.

2) The revenue requirements for the NND Project were inadvertently held constant from the years 2047-2054 instead of using the actual declining revenue requirements

stream. This was corrected in the Lynch 2016 Study and the Lynch 2017 Studies. Correcting the revenue requirements increases the NND Project benefit by \$2.1 million per year for 40 years.

3) The difference in the Accumulated Deferred Income Tax (“ADIT”) between the two alternatives was manually set to derive an NND Project net benefit of exactly \$28 million over 40 years in the base case scenario. Replacing this with actual ADIT calculations for the NND Project and the combined cycle alternative decreases the NND Project benefit by \$21.2 million per year for 40 years.

4) BLRA revenue requirements were not calculated for the NND Project for the half year prior to going in service. This was corrected in the Lynch 2016 Study and the Lynch 2017 Studies. Including these costs decreases the NND Project benefit by \$22.0 million per year for 40 years, or \$26.6 million per year for 20 years.

5) The abandonment costs were assumed to be levelized using an outdated set of capitalization ratios (from December 31, 2013), and did not consider ADIT. This was corrected in the Lynch 2017 Studies but not the Lynch 2016 Study. Correcting the abandonment cost calculation with ADIT decreases the NND Project benefit by \$67.0 million per year for 40 years, or \$33.5 million per year for 20 years.

The net effect of these corrections decreases the NND Project benefit by \$88.4 million per year for 40 years:

	<b>Base Gas</b>	<b>50% Higher Gas</b>	<b>100% Higher Gas</b>
\$0 CO2 Price	(\$60)	\$55	\$159
\$15 CO2 Price	\$9	\$121	\$237
\$30 CO2 Price	\$78	<b>\$190</b>	\$303

**Q. WHAT IS THE BASIS FOR ASSUMING A TWO-YEAR DELAY IN THE NND PROJECT?**

**A.** As ORS witness Gary C. Jones stated in his direct testimony, in 2015 the NND Project owners retained the Bechtel Power Corporation (“Bechtel”) to perform an independent assessment of the project. Bechtel presented their findings at a meeting on October 22, 2015 (Exhibit GCJ-2.37) and in the draft Bechtel report dated November 9, 2015 (Exhibit GCJ-2.40), which included the following projected commercial operation dates (“COD”):

	<b>Unit 2</b>	<b>Unit 3</b>
Current COD	June 2019	June 2020
Adjustment	18 to 26 months	24 to 36 months
New COD	Dec 2020 to Aug 2021	June 2022 to June 2023

Assuming a two-year delay on both units (to June 2021 for Unit 2 and June 2022 for Unit 3) is a straightforward change to apply to the Lynch 2015 Study and is consistent with the Bechtel assessment. This is much less than the actual delay of between three and four years that SCE&G determined after the Westinghouse bankruptcy<sup>1</sup>.

**Q. WHAT IMPACT DOES A TWO-YEAR DELAY HAVE ON PRODUCTION TAX CREDITS?**

**A.** In 2015, in order to be eligible for the federal production tax credits, the NND Project would have to be placed into service before January 1, 2021. With the two-year delay, Unit 2 would not come online until June 2021 and Unit 3 in June 2022, missing this

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<sup>1</sup> SCE&G Filing in Civil Action No. 3:18-cv-1795-JMC, “Verified Complaint for Declaratory Judgement and Temporary, Preliminary and Permanent Injunctive Relief”, dated June 29, 2018 , page 30, Line 152.

1 deadline. The loss of the production tax credits reduces the NND Project benefit by \$91.7  
2 million per year for 40 years, or \$110.9 million per year for 20 years.

3 **Q. HOW WERE THE COST IMPACTS OF A TWO-YEAR DELAY DETERMINED?**

4 **A.** The projection of cash spent on the NND Project for the year 2016 was duplicated  
5 for the years 2017 and 2018, with the remaining cash projections delayed for two years.  
6 This increases the total cost of the NND Project, including Allowance for Funds Used  
7 During Construction, to \$9.0 billion. This is less than the \$9.9 billion cost estimate (before  
8 applying the Toshiba corporate guarantee settlement payment) that the NND Project  
9 owners developed after the Westinghouse bankruptcy, according to Dr. Lynch's testimony  
10 in this docket. The construction costs for the combined cycle alternative were escalated  
11 2% per year, consistent with the assumptions made in the Lynch 2015 Study.

12 The differences in production costs between completing the NND Project and the  
13 combined cycle alternative were assumed to be zero in 2019 and 2020, since the same  
14 power supply resources are used in both cases. With a two-year delay, the 2021 production  
15 costs should reflect one unit in service for half of the year, and the 2022 costs should reflect  
16 one unit for the entire year and the second unit for half of the year. The 2021 and 2022  
17 production costs used in the Lynch 2015 Study reflect both units online for the entire year.  
18 The two-year delay production cost impact was estimated by assuming no difference in  
19 2021 costs and the full two-unit cost difference in 2022.

20 **Q. WHAT WERE THE RESULTS OF YOUR ANALYSIS?**

21 **A.** By including the spreadsheet corrections, a two-year delay in the NND Project, and  
22 the loss of production tax credits, the most likely scenario cited in the Lynch 2015 Study  
23 shows that abandoning the NND Project and replacing with the combined cycle alternative

results in an economic benefit of \$127 million per year over 40 years, or \$236 million per year over 20 years. All nine scenarios using the base load forecast show an economic advantage over 40 years for abandoning the NND Project:

	Base Gas	50% Higher Gas	100% Higher Gas
\$0 CO2 Price	(\$355)	(\$251)	(\$157)
\$15 CO2 Price	(\$291)	(\$190)	(\$85)
\$30 CO2 Price	(\$227)	(\$127)	(\$25)

**Q. IN 2015, DID DR. LYNCH CONSIDER HOW MUCH NUCLEAR CONSTRUCTION COSTS COULD INCREASE WHILE STILL BEING ECONOMICALLY VIABLE?**

**A.** In his testimony for Docket No. 2015-103-E, Dr. Lynch states that “the total construction cost would have to increase from \$6.8 billion to about \$9.9 billion to reach the breakeven point between the alternatives.” However, this sensitivity analysis assumed that the NND Project would complete on the same schedule without delay. The loss of production tax credits and the decrease in production and carbon cost benefits associated with a two-year delay are significant, which is why the associated \$9.0 billion NND Project cost is no longer economic.

**Q. WHAT CHANGES OCCURRED BETWEEN THE LYNCH 2015 AND 2016 STUDIES?**

**A.** Natural gas prices continued to decline throughout 2015 and early 2016, and the forecasts used in the Lynch 2016 Study decreased at least 19% beginning in 2019.

The final version of the Environmental Protection Agency’s (“EPA”) Clean Power Plan was released on August 3, 2015, but enforcement of the plan was halted by the Supreme Court on February 9, 2016, pending a review of the rule by the United States



Court of Appeals for the D.C. Circuit. As a result, in the Lynch 2016 Study, CO<sub>2</sub> costs were delayed from 2020 to 2025, with the most reasonable scenario changing from \$30/ton to \$15/ton.

In the petition for Docket 2016-223-E, the total cost of the NND Project increased by \$852 million, from \$6.8 billion to \$7.7 billion, and the online dates were delayed by two months. The actual gross construction expenses from April 1, 2015 through March 31, 2016 were approximately \$764 million, which means that the remaining cost to complete the NND Project increased by \$88 million between the two filings.

**Q. WHAT DID DR. LYNCH CONCLUDE IN THE 2016 STUDY?**

**A.** In spite of the lower natural gas and CO<sub>2</sub> cost forecasts, and the increase in the remaining cost to complete the NND Project, the Lynch 2016 Study showed an increase in the benefit of continuing with the NND Project, from \$278 million per year for 40 years in 2015 to \$374 million per year for 40 years in 2016:

	Base Gas	50% Higher Gas	100% Higher Gas
\$0 CO2 Price	\$84	\$177	\$269
\$15 CO2 Price	\$263	<b>\$374</b>	\$468
\$30 CO2 Price	\$433	\$562	\$663

**Q. HOW IS THAT POSSIBLE?**

**A.** In the Lynch 2016 Study, the ADIT calculations were performed separately and incorrectly using a project start year of 2016 instead of 2019 and did not use a consistent set of assumptions for the financing rates, book life, and total cost. This error increased the NND Project benefit by \$31.4 million per year for 40 years.

Beginning with the Lynch 2016 Study, SCE&G assumed that the transmission portion of the NND Project would not be abandoned. The total transmission cost assumed

1 was \$398 million, which added \$33.7 million over 40 years to the benefit of continuing  
2 with the NND Project.

3 The Lynch 2016 Study also assumed that abandonment would not occur until the  
4 end of the year, December 31, 2016. As a result, the forecasted expenses from April 1 to  
5 December 31 for that year were treated as sunk costs instead of costs that would be avoided  
6 with the decision to abandon. This incorrectly increased the sunk costs by about \$742  
7 million. ADIT was not considered either, like the Lynch 2015 Study, but was correctly  
8 included with the Lynch 2017 Studies. These errors added \$172.7 million over 40 years to  
9 the benefit of continuing with the NND Project.

10 And finally, beginning with the Lynch 2016 Study, SCE&G changed how CO<sub>2</sub>  
11 costs were considered, and in the process, introduced a significant error that overstated  
12 NND Project benefits by \$140.3 million per year for 40 years.

13 **Q. PLEASE EXPLAIN THE PROBLEM WITH THE REVISED CALCULATION OF**  
14 **CO<sub>2</sub> COSTS.**

15 **A.** According to Dr. Lynch's testimony in Docket 2016-223-E, he assumed that if the  
16 NND Project continues, then the State of South Carolina would choose the "rate-based"  
17 compliance option in EPA's Clean Power Plan, instead of applying the "mass-based"  
18 compliance option that was used in all prior analysis, and in the Lynch 2016 Study for the  
19 abandonment/combined-cycle alternative. He states, "Under a rate-based compliance plan  
20 the new nuclear units would count towards compliance and would generate sufficient  
21 emission rate credits such that SCE&G would not be required to incur any additional CO<sub>2</sub>  
22 compliance costs under the Clean Power Plan. Therefore, the cost of CO<sub>2</sub> emissions to  
23 SCE&G and its customers will be zero." This is an assumption that is not based on any

1 analysis, and in fact, the PROSYM model that Dr. Lynch uses to calculate CO<sub>2</sub> costs is  
2 incapable of modeling rate-based compliance options.

3 Under a mass-based plan, a state creates allowances that permit electric generating  
4 units to emit one ton of CO<sub>2</sub>, up to the total amount allowed for that state under the Clean  
5 Power Plan. States can then allocate these to utilities, independent power producers, or  
6 other entities. Under a cap-and-trade framework allowed under the Clean Power Plan (and  
7 already in place for SO<sub>2</sub> and NO<sub>x</sub> emissions markets), companies that emit less than their  
8 allocation can sell their excess allowances to companies that emit more than their  
9 allowance. The price for these trades corresponds to the CO<sub>2</sub> costs of \$15/ton and \$30/ton  
10 that SCE&G has been analyzing since 2008. In other words, the real cost to a utility is not  
11 a tax based on the price times the total amount of emissions, but to trades based on the  
12 price times the difference between the total emissions and the allocated allowances.

13 When comparing two different power supply alternatives such as the NND Project  
14 or combined cycle under the same emission compliance option (as has been done in all  
15 prior analysis), it is not necessary to consider the amount of allocated allowances, since  
16 they would be the same under either alternative and would cancel each other out in the  
17 comparison. The rate-based compliance option does not use allocations of allowances,  
18 since these are effectively represented through the targeted emissions rates. When  
19 comparing costs between mass-based and rate-based plans, the allowance allocations must  
20 be considered, and would be very valuable for utilities such as SCE&G with significant  
21 amounts of coal-fired generation in 2005 (the base year used for the Clean Power Plan).

22 Because of the PROSYM modeling limitations, the best approach for SCE&G  
23 would have been to continue to calculate CO<sub>2</sub> costs based on a mass-based compliance

option for both alternatives. If the difference in CO<sub>2</sub> emissions between the alternatives in the Lynch 2015 Study is applied to the appropriate years in the Lynch 2016 Study at the appropriate prices, the benefit of continuing with the NND Project is reduced by \$140.3 million per year for 40 years.

**Q. WHAT IS THE RESULT OF THE 2016 ANALYSIS USING A CONSISTENT AND CORRECT SET OF ASSUMPTIONS?**

**A.** Continuing the NND Project is no longer economic based on the most likely scenario, even without considering the delay that was included in the draft Bechtel Report:

	<b>Base Gas</b>	<b>50% Higher Gas</b>	<b>100% Higher Gas</b>
\$0 CO2 Price	(\$154)	(\$61)	\$25
\$15 CO2 Price	(\$94)	<b>(\$5)</b>	\$81
\$30 CO2 Price	(\$25)	\$79	\$141

**Q. DID YOU REVIEW THE LYNCH 2017 STUDIES?**

**A.** Yes, these studies evaluated continuing both NND Project units with 55% ownership, abandoning unit 3 and continuing unit 2 with 55% ownership, and abandoning unit 3 and continuing unit 2 with 100% ownership. The CO<sub>2</sub> costs in these studies have the same problem as in the Lynch 2016 Study that I described earlier. When correcting for this, none of the 3 alternatives are economic as compared to the combined cycle alternative.

**Q. WILL YOU UPDATE YOUR TESTIMONY BASED ON INFORMATION THAT BECOMES AVAILABLE?**

**A.** Yes. ORS fully reserves the right to revise its recommendations via supplemental testimony should new information become available not previously provided by SCE&G, or from pending state and federal investigations and lawsuits.

- 1    **Q.     DOES THIS CONCLUDE YOUR TESTIMONY?**
- 2    **A.            Yes, it does.**